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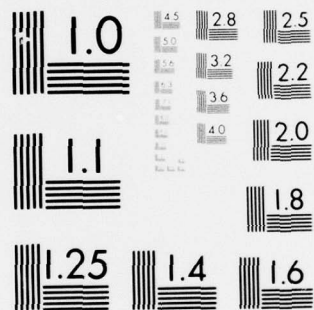
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10 Donald B. Rice

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# GOVERNMENT AND THE NATION'S RESOURCES\*

Donald B. Rice

The Rand Corporation, Santa Monica, California

In these past several months, all of us had even more reason than usual to be glad we live in Los Angeles and not in Chicago or New York. I refer not only to the epic winter, but to the natural gas shortage that compounded its hardships. Unlike other parts of the country, no one in Southern California has died from the gas shortage, or been forced out of business, or lost a job. By and large we were observers, this time, of a disastrous, national commodity shortage.

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\* This is the text of a talk delivered in Los Angeles before a Town Hall of California audience on March 15, 1977.

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As business men and women you very likely recall, perhaps too well, another time of widespread shortage in this country. That was in 1973-74, when we saw sudden and sharp price increases for nearly all raw materials and industrial commodities, and felt the downstream effects on most manufactured products. Even at the premium prices of that period, purchasing agents couldn't get what they needed to fill supply lines. Lead times for orders were lengthened, discounts disappeared, double ordering was frequent, and customers were put on allocation in an attempt to adjust to the shortages. Assuring supply became more important to industry management than shopping for price, to the point that cost savings were sometimes passed up in an effort to cement ties to established suppliers for future deliveries. This was especially true in the markets for primary commodities, such as aluminum, copper, chemicals, steel, paper, and plastics. No comparable period of national shortages had occurred since the Korean War.

Basic and pervasive shortages of this kind are what I want to talk about today. Why do they happen? How vulnerable to them are we as a nation? What can be done to avert them or lessen their impact--in particular, what can be done in and by the federal government, as de facto

manager of the U.S. economy, to put government in a better position to prevent or moderate such shortages? What can be done to make less substantial the charge, in columnist George Will's phrase concerning the gas shortage, that government "often is the disease for which it pretends to be the cure?"

In truth, government must bear much of the blame for the two shortage periods I have just mentioned. The seeds of the gas shortage were sown by the government's policy of price regulation which, in the face of a diminishing abundance of gas, kept the price so cheap that everyone wanted it in preference to any other fuel. At the same time, price regulation worked to reduce supply by creating disincentives for capital investment. These two economic forces, increased demand and decreased supply, occurring together, provide the classic formula for inducing a shortage in any commodity. Add in environmental standards that are much easier to meet if you burn natural gas rather than oil or coal in power plants, and the only question was not whether, but when, we'd have a gas crisis. This past winter was only the last straw, bringing on the shortage whose eventual occurrence had been predicted for years.



The 1973-74 shortages of raw materials and commodities were also due in large part to myopic fumbling by government in the materials markets. For years the federal government had been pushing disparate, and often incompatible, policies at the materials-processing industries--policies of a kind that shaped the industry's decisions about how much productive capacity to build and how that capacity should be utilized, with an inevitable impact on supply.

The shortages were touched off by a worldwide boom in demand for primary commodities, beginning in about 1972. Although the causes of that boom have not yet been fully explained, its consequences were all too clear: As resource supplies became tight in the United States, we found ourselves unable to relieve the pinch with cheap imports as we had done in the past, because imports were no longer cheap.

U.S. inflation, balance-of-payments deficits, and fluctuations in currency exchange rates all contributed to stoking demand, here and abroad. But deeper roots, on the supply side, fed the shortages here. For one thing, between 1966 and 1973 there was a dramatic decline from previous periods in growth rates of productive capacity for the



materials-processing industries (chemicals, primary metals, paper, textiles, and the like). Capital formation in those primary industries occurred at a far slower rate than in other segments of the U.S. economy. As a result, those industries entered the 1973-74 period with stunted productive capacity, leaving them unable to accomodate to the worldwide demand surge.

What, we may ask, were the reasons for nearly a decade of sluggish growth?

One reason for low growth during the early part of the 1966-73 period was that those industries were still, through the mid sixties, working off excess capacity built up during the period after the Korean War--a build-up due in part to government incentives. Other brakes on normal growth in capacity up to 1973 were an overvalued dollar, uncertainty about how to comply with newly enacted environmental and safety legislation, and uncertainty surrounding both the imposition of price controls and changes in price-control regulations.

*It is the author's contention that*

In short, government intervention both before and during the shortage periods, particularly in our primary

*(cont on p 6)*

(cont. to p 5)

industries, served to create uncertainty and instability, which made investment in capacity expansion less attractive, which put a damper on supply, and, with the advent of the boom in world demand, helped to bring on and prolong the 1973-74 shortages in this country. As in the case of natural gas, government contributed more to the problem than to the solution. X

The view was prevalent in those days, and is still held by many today, that the shortages of 1973-74 could be attributed to the impending exhaustion of our natural resource base--that they were the outriders of catastrophes such as those predicted by the authors of the widely publicized Club of Rome study, Limits to Growth, published in 1973. That is not true, although the belief that it was true contributed to a certain amount of "run on the bank" behavior in the private economy, which served to aggravate and prolong the shortages.

The thesis of the "Limits" study is that exponential growth of population and income, coupled with current trends in pollution and resource depletion, will limit the rate of economic growth for the world within 100 years. The proponents believe that this will happen because many

physical factors, such as cultivable land, mineral resources, and the earth's capacity to absorb pollution, are finite. When the limits are reached, it is argued, rapid and catastrophic declines will set in, first for industrial capacity and later for population itself.

There are two things wrong with this doomsday theory. The first has to do with with the assumed limits on arable land and on mineral resources. Land primarily affects population, and resources affect industrial output. Expressing the finite limits of the earth's crust in terms of fixed quantities--i.e., so many acres of land and tons of recoverable mineral ores--has little practical meaning. Resources are more usefully measured in economic terms. If we want to pay the environmental price, additional productive land can be "created" by swamp drainage, irrigation, forest clearing, improved fertilizers, and so forth. And new mineral resources can be "discovered" by investments in exploration and also by technological change which allows the economical mining of ores previously not minable. In other words, it takes only the right conjunction of economics and technology to create new supplies of so-called "fixed" resources. And, in fact, the march of technology in modern times has kept pace with the growth of

population and the economy.

There is, unfortunately, widespread confusion about the distinction between mineral reserves and mineral resources. To the mining industry, reserves are like food in the pantry. They no more represent the total resource picture than does the stock of food in a pantry represent the quantity of food ultimately available to a family. Although the earth's crust is some 25 to 40 miles thick, today's mining operations only go down some hundreds of feet. And the seabed, which makes up about three-quarters of the earth's surface, is still virgin territory for exploration.

An excessive concentration on reserve figures can be misleading. For example, in 1950, worldwide reserves of copper were estimated at approximately 100 million metric tons, or about 40 years' supply at the rates of production then prevailing. Between 1950 and 1970, 80 million metric tons of copper were produced. Did that mean that the world was nearly out of copper by 1970? No. During this 20-year period, new discoveries of copper were sufficient not only to offset this cumulative production, but to boost reserves to 279 million metric tons. This latter figure was also about 40 years' supply at the higher rates of production



prevailing in 1970. While not universally true, similar increases can be reported for other minerals including iron ore, chromite, lead, and, yes, even oil.

The purpose of citing these examples is not to show that reserve increases of this magnitude can go on forever--they most certainly cannot. Ultimately there are finite limits to what is contained in the earth's crust. However, reserve figures, in and of themselves, give no indication of how close to those limits we are likely to be at any time. They represent only the tip of our resource iceberg.

One indication, not necessarily typical, of how vast these resources might be can be seen in the case of phosphorus. A study produced in 1971 reached the alarming conclusion that the world would soon "run out" of phosphorus--a vital element in food production--on the basis of data showing reserves of the material sufficient to last only between 60 to 90 years. When the study was revised just a year later, the estimated grace period was extended to 90 to 130 years. A more recent study analyzed the two previous ones and concluded that reserves of phosphorus would not be exhausted for 500 to 1000 years. By adding in

longer-term inferred (undiscovered) resources, the study finds that we may not "run out" of phosphorus for as long as 2 million years. What these and similar studies tell us is that estimates of either reserves or resources are subject to much uncertainty and depend heavily on assumptions and definitions. And they illustrate the fallacy of using estimates of reserves--supplies that are, so to speak, on the shelf--to infer ultimate resource availability.

The second thing wrong with the doomsday theory is that it does not give adequate attention to economic adjustment mechanisms--when they are allowed to operate. The most important of these is price. As a resource becomes scarce, price rises, demand is reduced, additional supplies are brought to market, reclaiming and recycling options begin to look attractive, and there may be technological innovations to develop substitutes. Further, as price rises, or cost declines, the volume of materials considered minable increases exponentially--not by 5 to 10 times, but by 100 to 1000 times.

This is not to say, however, that we can be comfortable about the world resource picture. Quite the contrary, for there are some large and crucial assumptions underlying an



optimistic view. One is that population growth can be made to level off in the reasonably near future. Another is that we can find ways to make our energy supplies more adequate and more secure. A third is that international barriers (since mineral resources are not everywhere equally distributed) won't arbitrarily restrict supply availability. But it is precisely problems such as these that should command our serious attention, and not questions of whether we have 10 years or 30 years, or even 300 years, of minerals supply left in our reserves.

Supply sufficiency in the future will require closer monitoring and better forecasting of trends in resource availability. In the past, we have relied largely on market mechanisms to point the way to a desired pattern of resource development. In the years ahead, a number of forces will pose new challenges to the efficient functioning of markets. The lead times required to build new plants and to develop and commercialize new technologies may well become longer. The already large capital requirements for both are likely to increase. In a world of increasing interdependence, the impact of unexpected events, such as the discovery that a key technology which has been counted on to yield a new source of supply also yields a byproduct dangerous to

society, may be more severe and widespread. Examples that come immediately to mind are plutonium produced by nuclear power reactors and toxic residues from the production of certain important industrial chemicals. The combination of these and other such developments will demand from government a more sophisticated, more responsible role in interpreting market signals and in supplementing them with its own initiatives, without itself becoming a major destabilizing force in the economy. I will return to this point in a moment.

Another, and related, perception of people who thought beyond the 1973-74 shortages was, and still is, that the U.S. is becoming more and more dependent on foreign sources for the supply of all sorts of important minerals and commodities. They see this as a major and growing threat to our national economic security, and one hears all kinds of extravagant proposals for countering it. An obvious but sometimes forgotten point is that the United States imports nonfuel minerals in the amount of some \$6.5 billion per year, along with some \$100 billion worth of other goods, because the nation and its citizens thereby gain economic advantages--lower costs and higher real incomes. It would make no national economic sense to forego those advantages

unless there were compelling national reasons for doing so. Import dependence, in other words, is not a problem as such; for example, it is simply misleading to cite a U.S. "deficit" in the minerals trade as though this represents in some pertinent sense a national loss.

The truth is that, apart from oil, the view that U.S. import dependence has been rising rapidly has little basis in fact. Import dependence has risen in some cases and declined in others. For example, the United States remained self-sufficient (and in some cases a net exporter) from 1950 to the 1969-73 period in nine nonfuel minerals, self-sufficiency meaning that domestic primary production as a percentage of primary demand was 100 percent or more. Import dependence has increased in 11 cases. There were five cases, the most noteworthy of which was copper, in which import dependence decreased. In one instance--lead--it did not change at all. Finally, in three other cases--chromium, tin, and titanium metal--there was virtually no domestic production in 1950 nor in the period 1969-73. Excluding petroleum, the net increase in American dependence on foreign materials sources over this period of 20 years can reasonably be said to have been quite modest.

Moreover, since many of the developed countries of the world are major exporters of a number of resource materials and basic commodities--the U.S., itself, is one, as are, for example, Canada and Australia--a very small number of items would appear as critical on any "threat" list, and any danger here could be buffered by a quite limited stockpiling program.

On the other hand, it is important to recognize that there are legitimate, and growing, claims by the underdeveloped countries, the so-called Third World, for a larger share of the world's income and wealth. Some of these countries are major suppliers of raw materials, and they see in the example of OPEC a way to use their natural resources to obtain leverage for staking out those claims. It is not likely, however, that strategies incorporating measures such as price gouging, withholding, and expropriation will work over the long term, at least not for the nonfuel minerals. These strategies tend to be self-defeating. They turn away capital investment, and they create strong incentives on the part of the customer nations to seek alternative supply sources and substitute materials. The recent experience with bauxite, the ore from which aluminum is made, is a case in point. A six-fold increase



in the Jamaican tax on bauxite exports, announced in March 1974, has resulted in an approximate 150 percent increase in the delivered price of bauxite to the United States from the Caribbean. But this increase has begun to erode as a result of precisely the kind of import-country reactions that I have just mentioned.

Further, it is at least possible that international agreements could be negotiated to prohibit raising artificial barriers to exports, so that access to supplies by importing nations would be reasonably assured. While the analogy is not perfect, such agreements might resemble the GATT (General Agreements on Tariffs and Trade) rules on import tariffs and quotas, under which the contracting parties forego the unfettered right to impose new limitations on imports. On the whole, the GATT rules have worked.

The relatively optimistic picture I have painted about the long-run state of resource availability and the issue of import dependence should not be taken as signifying that I am unconcerned about the future availability of important materials. I am indeed concerned. But my concern does not stem from questions of crustal exhaustion or import

dependency. It goes instead to issues of the sort I raised at the beginning of this talk, when I referred to the root causes of both the current natural gas shortage and the shortages of 1973-74.

I am convinced that, leaving energy aside, any significant materials shortage the United States will experience within the next quarter century--and probably for generations thereafter--will result from short-run shocks that produce shifts in demand or supply large and abrupt enough to exceed the immediate adjustment capabilities of the materials-producing and materials-using industries. While certain of these abrupt shifts will lie outside human control, a surprisingly high proportion of them will be related, either directly or indirectly, to the actions of governments, our own included. Certain steps need to be taken to increase the likelihood that our own government does not inadvertently generate disruptions because it is unaware of the consequences of its own actions, and to improve our intelligence concerning possible disruptive actions by foreign governments so that these can be either deterred or their effects moderated. I do not have the time in this talk to go into great detail about the actions required, but I can outline them briefly.



First, some basic changes should be made in the traditional line departments of government, including some of their traditions. I am referring in particular to Interior and Commerce, which are concerned specifically with resources and nonfood commodities. One such change is to establish in those departments the mandate and means for the collection, processing, and publication of information about U.S. natural resources and primary commodities, and about those of the rest of the world to the extent that we can do so. These activities should be carried out regularly and systematically, in keeping with professional standards of statistical and analytic practice that guard against the kinds of distortions introduced by industry pressures or political preferences or prior policy positions. (The Census Bureau and the Bureau of Labor Statistics provide useful models of how this should be done.) In this connection, we should make every effort to insulate such monitoring activities from those concerned with ongoing programs and promotions.

Next, we should establish within those cabinet departments a better professional capacity to do policy

analysis aimed at understanding the impact of government actions (before, not after, the fact) on a given industry or economic sector--and we should likewise shield that function to protect its objectivity. Good policy analysis can lay out the relevant alternative action possibilities, and provide insights into costs, risks, benefits, and policy interrelationships that would not otherwise be apparent. Furthermore, it would be a healthy development if the outside analytic community were brought into this process, through contract arrangements that would encourage the development and surfacing of independent points of view.

Given these changes in the line departments, it seems imperative to integrate the information they would produce into a comprehensive picture of how government policies combine to affect basic industry, and, beyond that, the broad national interest. One objective here would be to alert high-level decisionmakers to the possible consequences of events which separately may be of little concern, but together can foreshadow major problems. A way to do this is to create within the Executive Office of the President a cadre of specialists whose job it would be to monitor key industries and sectors, develop a framework for analyzing the comprehensive effects of proposed major federal policy

actions, and monitor the basic data collection, data analysis, and policy analysis activities of the line organizations.

But quite apart from monitoring and analytic activities, and other aspects of institutional reform, ways must be found to force the government to consider the longer-term and broader implications of its actions. This requires a comprehensive policy planning capability designed not to set detailed economic and social goals for the nation, but to put the government's internal house in order and to deepen understanding of how government policies relate to and impact on one another, and affect important sectors of the economy. No single action would do more to enhance this function than the adoption of a meaningful form of multi-year budgeting. One-year-at-a-time budgeting is arbitrary--the time required to change government policies is not necessarily related to the time it takes the earth to orbit the sun. A multi-year perspective is required both to foresee the impact of policy changes and to appreciate opportunities for reallocating manpower and material resources.

Government is deeply involved in our economy because

our citizens, wisely or not, want it to be. And for all their mistrust of government, many mistrust "impersonal" markets even more. But there are some things government can't do as well as markets, and its efforts to do them only add to a growing suspicion in the nation that the government is simply incapable of handling many of the complex tasks that have been thrust upon it. Too often, government agencies have been found to be operating--unknowingly--at cross purposes. Programs originally hailed as "solutions" end up leading to still more programs designed to fix up problems created by the first. Along with the gas crisis, we seem also to be having a crisis of confidence in the government's ability to govern, across the board. There are no panaceas in sight, but we may be able to improve matters, noticeably, if we recognize the real causes of our problems and work toward resolving them through the kinds of measures I've suggested here.

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One final note. What I have discussed here today stems largely from the findings and recommendations of the

National Commission on Supplies and Shortages. Established by the Congress in September 1974, the Commission was mandated to look into the kinds of questions I have been talking about here, and to make recommendations to the President and the Congress. The Commission's thirteen members included four Administration officials, two Senators, two Congressmen, and five private citizens. As one of the latter group, I was honored to serve as Commission Chairman. If I have piqued your interest in some of these matters today, I would commend to you the Commission's 200-page final report, entitled Government and the Nation's Resources, which is available from the Government Printing Office in Washington, D.C.